

CLAIMS

1. A process for purifying polluted air, which process includes passing polluted air
5 through a fluidized bed of micro-organism-containing particulate media while simultaneously
stirring the fluidized bed so that, as the polluted air passes through the fluidized bed, organic
pollutants therein are decomposed by the micro-organisms, with purified air containing a
lower level of the organic pollutants than the polluted air that enters the fluidized bed,
emerging from the fluidized bed.
- 10 2. A process according to Claim 1, wherein the micro-organism-containing
particulate media comprises inert particles coated with an active medium or biomass.
3. A process according to Claim 2, wherein the particles have sizes that range
15 from sub-micron to 5mm.
4. A process according to any one of Claims 1 to 3 inclusive, wherein the air that
passes through the bed of particulate media acts also as fluidizing medium for the particulate
media, and wherein the air flow rate is from 0.7m/s to 1.5m/s.
- 20 5. A process according to any one of Claims 1 to 4 inclusive, which includes
maintaining the fluidized bed at or near anaerobic conditions by controlling the humidity in the
fluidized bed.
- 25 6. A process according to any one of Claims 1 to 5 inclusive, which includes
moistening the polluted air before passing it through the fluidized bed.
- 30 7. Air purification apparatus, which includes
a vessel providing an air purification chamber, with the vessel being adapted such
that polluted air can enter the air purification chamber at a low level while purified air can exit
the air purification chamber at a higher level;

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a plurality of micro-organism-containing particulate media in the air purification chamber, the particulate media being capable of being fluidized by air which passes through the air purification chamber; and

5. a mixer in the air purification chamber, for mixing a fluidized bed of the particulate media which forms in the air purification chamber, in use.

8. Apparatus according to Claim 7, wherein the vessel comprises an operatively upright cylindrical wall component; an apertured or perforated floor spanning the inside of the wall component, with the openings in the floor constituting air inlet openings; and an
10 apertured or perforated roof also spanning the inside of the wall component and spaced from the floor, with the openings in the roof constituting air outlet openings, and with the air purification chamber thus defined between the wall, the floor and the roof.

9. Apparatus according to Claim 8, which includes an air conditioning chamber
15 below the air purification chamber, when the vessel is located uprightly, with the air conditioning chamber having an apertured roof and a floor spaced from its roof, such that air can pass through the openings in the conditioning chamber roof into the purification chamber.

10. Apparatus according to Claim 9, wherein air/liquid contact means is provided in
20 the conditioning chamber, together with water distribution means for introducing water into or onto the air/liquid contact means.

11. Apparatus according to Claim 9 or Claim 10, wherein an air inlet chamber is provided below the conditioning chamber, with the floor of the conditioning chamber being
25 perforated and constituting a roof of the air inlet chamber.

12. Apparatus according to Claim 11, wherein an imperforate base, spaced from the air inlet chamber roof; a cylindrical vessel wall component extending between the base and the air inlet chamber roof; and an air inlet in the vessel wall component, are provided.
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13. Apparatus according to any one of Claims 8 to 12 inclusive, wherein a purified air chamber is provided above the air purification chamber, with the roof of the air purification chamber constituting a floor of the purified air chamber.

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14. Apparatus according to Claim 13, which includes an Imperforate roof, spaced from the purified air chamber floor, a cylindrical vessel wall component located between the purified air chamber floor and its roof, and a purified air outlet in the purified air chamber roof.

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particulate media comprises inert particles coated with an active medium or biomass.
3. A process according to Claim 2, wherein the particles have sizes that range
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4. A process according to ~~any one of Claims 1 to 3 inclusive~~ Claim 1, wherein the
air that passes through the bed of particulate media acts also as fluidizing medium for the
particulate media, and wherein the air flow rate is from 0.7m/s to 1.5m/s.
- 20 5. A process according to ~~any one of Claims 1 to 4 inclusive~~ Claim 1, which
includes maintaining the fluidized bed at or near anaerobic conditions by controlling the
humidity in the fluidized bed.
- 25 6. A process according to ~~any one of Claims 1 to 5 inclusive~~ Claim 1, which
includes moistening the polluted air before passing it through the fluidized bed.
- 30 7. Air purification apparatus, which includes
a vessel providing an air purification chamber, with the vessel being adapted such
that polluted air can enter the air purification chamber at a low level while purified air can exit
the air purification chamber at a higher level;

a plurality of micro-organism-containing particulate media in the air purification chamber, the particulate media being capable of being fluidized by air which passes through the air purification chamber; and

5 a mixer in the air purification chamber, for mixing a fluidized bed of the particulate media which forms in the air purification chamber, in use.

8. Apparatus according to Claim 7, wherein the vessel comprises an operatively upright cylindrical wall component; an apertured or perforated floor spanning the inside of the wall component, with the openings in the floor constituting air inlet openings; and an
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15 below the air purification chamber, when the vessel is located uprightly, with the air conditioning chamber having an apertured roof and a floor spaced from its roof, such that air can pass through the openings in the conditioning chamber roof into the purification chamber.

10. Apparatus according to Claim 9, wherein air/liquid contact means is provided in
20 the conditioning chamber, together with water distribution means for introducing water into or onto the air/liquid contact means.

11. Apparatus according to Claim ~~9 or Claim 10~~, wherein an air inlet chamber is provided below the conditioning chamber, with the floor of the conditioning chamber being
25 perforated and constituting a roof of the air inlet chamber.

12. Apparatus according to Claim 11, wherein an imperforate base, spaced from the air inlet chamber roof; a cylindrical vessel wall component extending between the base and the air inlet chamber roof; and an air inlet in the vessel wall component, are provided.
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13. Apparatus according to ~~any one of Claims 8 to 12 inclusive~~ Claim 8, wherein a purified air chamber is provided above the air purification chamber, with the roof of the air purification chamber constituting a floor of the purified air chamber.

14. Apparatus according to Claim 13, which includes an imperforate roof, spaced from the purified air chamber floor; a cylindrical vessel wall component located between the purified air chamber floor and its roof, and a purified air outlet in the purified air chamber roof.

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particulate media acts also as fluidizing medium for the particulate media, and wherein the air
flow rate is from 0.7m/s to 1.5m/s.
- 20 5. A process according to Claim 1, which includes maintaining the fluidized bed at
or near anaerobic conditions by controlling the humidity in the fluidized bed.
- 25 6. A process according to Claim 1, which includes moistening the polluted air
before passing it through the fluidized bed.
7. Air purification apparatus, which includes
30 a vessel providing an air purification chamber, with the vessel being adapted such
that polluted air can enter the air purification chamber at a low level while purified air can exit
the air purification chamber at a higher level;

a plurality of micro-organism-containing particulate media in the air purification chamber, the particulate media being capable of being fluidized by air which passes through the air purification chamber; and

5 a mixer in the air purification chamber, for mixing a fluidized bed of the particulate media which forms in the air purification chamber, in use.

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11. Apparatus according to Claim 9, wherein an air inlet chamber is provided below the conditioning chamber, with the floor of the conditioning chamber being perforated and
25 constituting a roof of the air inlet chamber.

12. Apparatus according to Claim 11, wherein an imperforate base, spaced from the air inlet chamber roof; a cylindrical vessel wall component extending between the base and the air inlet chamber roof; and an air inlet in the vessel wall component, are provided.

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13. Apparatus according to Claim 8, wherein a purified air chamber is provided above the air purification chamber, with the roof of the air purification chamber constituting a floor of the purified air chamber.

14. Apparatus according to Claim 13, which includes an impermeate roof, spaced from the purified air chamber floor; a cylindrical vessel wall component located between the purified air chamber floor and its roof, and a purified air outlet in the purified air chamber roof.